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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/652,600	08/30/2000	Stephen Marschner	MS1-529US	3040

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EXAMINER	
BRODA, SAMUEL	

ART UNIT	PAPER NUMBER
2123	7

DATE MAILED: 03/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/652,600	MARSCHNER ET AL.	
	Examiner	Art Unit	
	Samuel Broda	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-46* is/are pending in the application.

4a) Of the above claim(s) *36-46* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 22-35* is/are rejected.

7)☒ Claim(s) *18-21* is/are objected to.

8)☒ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 August 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 2.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This communication is in response to Applicants' Response to Office Action Dated January 12, 2004 (the "Response") sent via facsimile on 17 February 2004. In the Response, Applicants elected the claims of Group I without traverse.

2. Claims 1-35 have been examined.

Election/Restriction

3.1 Claim 16 is generic and allowable in substance. Accordingly, the restriction requirement as to Group II (claims 17-23 and 32-35) is hereby withdrawn and these claims are no longer withdrawn from consideration since all of the claims to this species depend from or otherwise include each of the limitations of an allowed generic claim.

In view of the above noted withdrawal of the restriction requirement as to the linked species, applicant(s) are advised that if any claim(s) depending from or including all the limitations of the allowable generic linking claim(s) be presented in a continuation or divisional application, such claims may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application. Once a restriction requirement is withdrawn, the provisions of 35 U.S.C. 121 are no longer applicable. See *In re Ziegler*, 44 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

3.2 Claims 36-46 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking

claim. Election was made without traverse in Paper No. 6.

Drawings

4. The three copies of color drawings and accompanying petition submitted with the original filing have been entered in the file. The Draftsperson has objected to the drawings; see the copy of Form PTO-948 for an explanation.

Claim Rejections - 35 U.S.C. § 112, Second Paragraph

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5.1 Claims 1-16 and 24-35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

5.2 Regarding claims 3, 9, and 12, these claims include the term "projects a pattern on the face;" similarly, claims 27-28 include the term "patterned light source." These terms are not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

5.3 Regarding claims 9 and 10, the term "one of the light sources" in claim 9 and the term "the one light source" in claim 10 each lack antecedent basis. Also, claim 10 is dependent on claim 9 and contradicts claim 9 regarding the number of light sources.

5.4 Regarding claims 12 and 32, claim 12 includes the term "second structured light source" and claim 32 includes the term "structured light." These terms are not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

5.5 Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01.

5.6 Regarding independent claims 1 and 12, each claim is directed to a "facial image-processing method" whereas the step limitations are directed to data acquisition. The omitted steps are the steps that perform the "image-processing."

5.7 Claims 24-31 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are the elements that perform the "image processing" of the data captured by the "data-capturing system."

5.8 Claims rejected but not described above are rejected as being dependent on a rejected claim.

Claim Rejections - 35 U.S.C. § 101

6. The following is a quotation of 35 U.S.C. 101:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6.1 Method claims 1-14 are rejected for reciting a process that is not directed to the technological arts.

Regarding claim 1, this claim is directed at a method for facial image-processing, whereas none of the limitations describe any type of computer-implemented steps. To be statutory, the utility of an invention must be within the technological arts. *In re Musgrave*, 167 USPQ 280, 289-90 (CCPA, 1970). The definition of "technology" is the "application of science and engineering to the development of machines and procedures in order to enhance or improve human conditions, or at least to improve human efficiency in some respect." (Computer Dictionary 384 (Microsoft Press, 2d ed. 1994)).

The limitations recited in claims 1-14 contain no language suggesting these claims are intended to be within the technological arts.

Claim Rejections - 35 U.S.C. § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –
(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the date of invention thereof by the applicant for patent.
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7.1 Claims 1-2, 17, and 22-23 are rejected under 35 U.S.C. 102(b) as being anticipated by Yuille et al, "Shape and Albedo from Multiple Images Using Integrability," 1997 IEEE Computer Society Conference on Computer Vision and Pattern Recognition, pp.158-164 (June 1997).

7.2 Regarding claims 1-2, Yuille et al teaches a facial image processing method comprising:

illuminating a face with illumination using multiple light sources [multiple light sources used while generating multiple images; see Section 2 "Previous Work" pages 158-9 and Fig. 1]; and

contemporaneously capturing structure data describing the face's structure and reflectance data describing reflectance properties of the face from the illumination [structure and reflectance data used to perform a singular value decomposition to create a generalized bas relief transformation; see Sections 4 through 6 at pages 160-4."

Therefore, Yuille et al anticipates claims 1 and 2.

7.3 Regarding claim 17, Yuille et al teaches a facial image processing method comprising:

illuminating a face with multiple different light sources [multiple light sources used while generating multiple images; see Section 2 "Previous Work" pages 158-9 and Fig. 1];

measuring range map data from said illuminating [range map data measured to form intensity matrix J; see Section 2 at pages 158-9];

measuring image data from said illuminating [image data measured to form intensity matrix J; see Section 2 at pages 158-9];

deriving a 3-dimensional surface from the range map data [surface data generated as part calculation of generalized bas relief transformation; see Section 4 at pages 160-1];

computing surface normals to the 3-dimensional surface [surface normals generated as part calculation of generalized bas relief transformation; see Section 4 at pages 160-1]; and

processing the surface normals and the image data to derive an albedo map [albedo maps generated as part of singular value decomposition; see Section 5 "The Full SVD Solution" at pages 161-162 and Fig. 3].

Therefore, Yuille et al anticipates claim 17.

7.4 Regarding claims 22-23, these claims are anticipated by Yuille et al using the analysis of claim 17 above.

7.5 Claims 1, 3-7, 11, and 24-31 are rejected under 35 U.S.C. 102(a) as being anticipated by Kriegman et al, "Shape and Enlightenment: Reconstruction and Recognition Under Variable Illumination," 1999 International Symposium on Robotics Research (October 1999)(paper available at: ftp://cvc.yale.edu/Renderings/Papers/rc3_ISRR99.ps).

7.6 Regarding claims 1-2, Kriegman et al teaches a facial image processing method comprising:

illuminating a face with illumination using multiple light sources [geodesic dome using 64 strobes; see Fig. 6 and Section 5.1 "Experimental Results"]; and

contemporaneously capturing structure data describing the face's structure and reflectance data describing reflectance properties of the face from the illumination [structure and reflectance data used to construct an illumination cone including albedo map; see Section 2 "The Illumination Cone."

Therefore, Kriegman et al anticipates claims 1 and 2.

7.7 Regarding claims 3-7 and 11, the limitations in these claims are not given any patentable weight as the type of lighting appears unconnected to the limitation regarding the capture of data. Therefore, claims 3-7 and 11 are anticipated by Kriegman.

7.8 Regarding independent claim 24, this claim is the system claim corresponding to claim 1 and is anticipated by Kriegman using the analysis of claim 1 above.

7.9 Regarding claims 25-31, the limitations in these claims are not given any patentable weight as the type of lighting appears unconnected to the limitation regarding the capture of data. Therefore, claims 25-31 are anticipated by Kriegman.

7.10 Claims 1 and 8-10 are rejected under 35 U.S.C. 102(a) as being anticipated by Debevec al, "Acquiring the Reflectance Field of Human Face," ACM Proceedings of the 27th Annual Conference on Computer Graphics and Interactive Techniques, pp. 145-156 (July 2000).

7.11 Regarding claims 1 and 8, Debevec et al teaches a facial image processing method comprising:

illuminating a face with illumination [illumination provided by moving light; see Fig. 10 page 151]; and

contemporaneously capturing structure data describing the face's structure and reflectance data describing reflectance properties of the face from the illumination using a camera having a polarizer [structure and reflectance data used to form reflectance functions; see pages 151-152 and equations (6) and (7).

Therefore, Debevec et al anticipates claims 1 and 8.

7.12 Regarding claims 9-10, the limitations in these claims are not given any patentable weight as the type of lighting appears unconnected to the limitation regarding the capture of data. Therefore, claims 9-10 are anticipated by Debevec.

Allowable Subject Matter

8.1 Claims 18-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8.2 Claims 12-16 and 32-35 would be allowable if rewritten to overcome the rejection(s) under one or both of 35 U.S.C. 101 and 35 U.S.C. 112, second paragraph, set forth in

this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to Applicants' disclosure. Reference to Hakura et al, U.S. Patent 6,593,925, is cited as teaching parameterized animation compression methods including generation of texture maps.

Reference to Chiang, U.S. Patent 6,341,878, is cited as teaching a method and apparatus for providing uniform diffuse illumination to a surface using a set of polarizers.

Reference to Benn et al, U.S. Patent 5,793,879, is cited as teaching image analysis of meat carcass portions using a lamp assembly including a infrared filter and polarizing filter. See column 6.

Reference to Bolle et al, U.S. Patent 5,631,976, is cited as teaching an object imaging system that uses polarizing filters over the camera and light source.

Reference to Backman et al, "Polarized Light Scattering Spectroscopy for Quantitative Measurement of Epithelial Cellular Structures In Situ," IEEE Journal on Selected Topics in Quantum Electronics, Vol. 5 No. 4, pp. 1019-1026 (July 1999), is cited as teaching the use of polarized light and beam splitters used to measure reflectance spectra of a human tissue model. See Fig.1.

10. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Samuel Broda, whose telephone number is (703) 305-1026. The Examiner can normally be reached on Mondays through Fridays from 8:00 AM – 4:30 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin Teska, can be reached at (703) 305-9704. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist, whose telephone number is (703) 305-3900.

SAMUEL BRODA, ESQ.
PRIMARY EXAMINER